New York ISO
Independent System Operator

Modeling Improvements for Capacity Accreditation Support: Non-Firm CAFs Methodology

Ryan Carlson

Senior Capacity Accreditation Analyst

ICAPWG/MIWG/PRLWG

Tuesday June 4, 2024

Today's Presentation

- **Background**
  - At the 4/17 ICAP Working Group, stakeholders requested that the NYISO provide Informational Capacity Accreditation Factor (CAF) values calculated with varying assumptions regarding the level of available oil in the fuel constraint model
    - The sensitivity cases containing the varying assumed levels of available oil were also requested at the Installed Capacity Subcommittee (ICS) and subsequently completed and presented at the 5/1 ICS meeting
  - Additional information about firm fuel election was discussed at the 5/8 ICAP Working Group

Link to April 17th ICAPWG Presentation: Non-Firm CAFs Methodology (nyiso.com)
Link to May 1st ICS Presentation: Gas Constraints Whitepaper Update (nysrc.org)
Link to May 8th ICAPWG Presentation: Gas Constraints Update (nyiso.com)

New York ISO

Gas Constraint Whitepaper

- As part of the NYSRC Gas Constraint Whitepaper, a 6-tired fuel constraint model is recommended to apply varying levels of available fuel amount the thermal units in Load Zones F-K for the months of December, January, and February
  - The whitepaper is based on the gas deliverability constraints in eastern New York as presented by the Market Monitoring Unit at the 10/20/2022 ICAP Working Group
- Under the recommended model, winter load levels will be used as a proxy for temperature to trigger the application of the fuel constraints and the level of available fuel decreases as load increases
- The initial modeling recommendation contains varying levels of available gas assumption and 11,000 MW of available oil assumption based on historical analysis. Sensitivity cases with varying levels of available oil assumptions were also conducted
  - Two sets of sensitivity cases were developed, one using the Tan45 methodology and one respecting the Transmission Security Limit (TSL) floor values
    - The sensitivity cases with respecting the TSL floor values are more applicable for the purpose of CAFs
  - These sensitivity cases incorporated varying available oil levels starting from 12,000 MW and decreasing to 6,000 MW at the 1,000 MW increment
- At this point, the fuel constraint model has not been adopted in the base case of the Installed Reserve Margin (IRM) study
  - The model will be included as a sensitivity off the upcoming Preliminary Base Case

New York ISO

Informational CAF Results

Notes for Informational CAF Results

- **The CAF reflects the marginal reliability value of the representative unit over a perfect unit. Calculation of CAFs is conducted on the finalized LCR base case**
- **Therefore, these informational Non-Firm CAF values are calculated using the sensitivity cases respecting the TSL floor values as the starting point base case**
  - The sensitivity cases respecting the TSL floor values are considered closer to a finalized LCR base case
- **Three methods were used to calculate the informational Non-Firm CAF results**
  - The three methods were the outcome of the discussion at the 4/17 ICAP Working Group
    - Method 1: representative unit does not add available fuel to the base model
    - Method 2: representative unit is subject only to the gas portion of the base model constraint and adds to the available fuel level during CAF calculation
    - Method 2a: representative unit is subject only to the gas portion of the base model constraint but does not add to the available fuel level during CAF calculation (derates to all units are recalculated)
- **The informational Non-Firm CAF results are based on the model assumptions included in the selected sensitivity cases and should not be considered a prediction of the final results for Non-Firm CAF. It should also be noted that over time, the fuel constraint base model in the IRM/LCR base case can be updated and hence impacting the Non-Firm CAF results.**

New York ISO

Non-Firm CAF Method 1: Modeling

- The representative (100 MW) Unit for the Non-Firm CARC is not available at loads above 22,000 MW during December, January and February beyond the base case model

NYCA Load Conditions (MW)	Dec, Jan, Feb: Representative Unit (MW)	All other months: Representative Unit (MW)	Gas Availability (MW)	Oil Availability (MW)	Available Fuel with Representative Unit (MW)
>26,000	0	100	375	11,000	11,375
25,000 - 26,000			750		11,750
24,000 - 25,000			2,750		13,750
23,000 - 24,000			4,500		15,000
22,000 - 23,000			5,500		16,500
<22,000	100		No Constraint		No Constraint

New York ISO

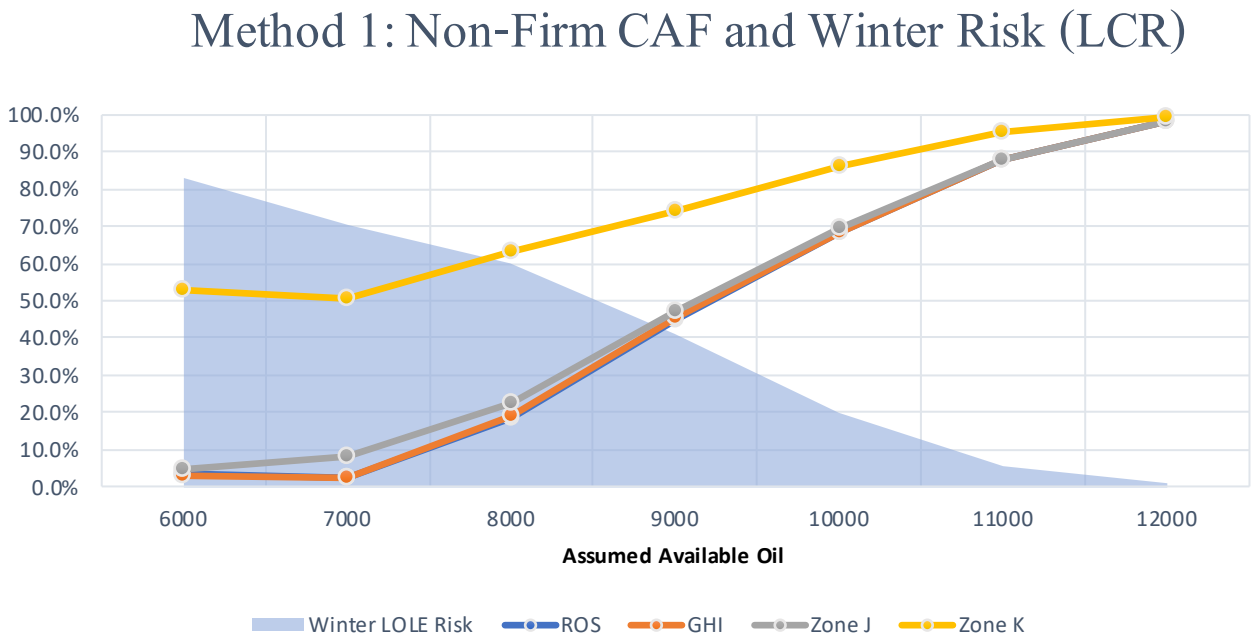
Non-Firm CAF Method 1: CAF Results

Available Oil Modeled	ROS	Zones GHI	Zone J	Zone K	Winter LOLE Risk
12,000	98.0%	98.0%	98.1%	99.3%	0.8%
11,000	87.7%	87.7%	88.0%	95.1%	5.6%
10,000	68.2%	68.4%	69.4%	86.0%	19.9%
9,000	45.1%	45.5%	47.1%	73.8%	41.0%
8,000	18.7%	18.8%	22.3%	63.0%	59.9%
7,000	2.3%	2.4%	7.9%	50.3%	70.2%
6,000	3.5%	3.2%	4.7%	53.1%	83.1%

The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Non-Firm CAF Method 1: Visual CAF Results



The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Non-Firm CAF Method 2: Modeling

- **The representative (100 MW) Unit for the Non-Firm CARC is derated by the same percentage as the derate being applied to the gas-only units in the base model in December, January, and February**
  - In the base model the available gas level is shared among all gas-only and dual fuel units and the available oil level is shared among only the dual fuel units
  - Therefore, a gas-only unit is subject to higher derate due to lower amount of available fuel
  - Under this methodology, flexibility with the available gas level in the base model is assumed to exist and therefore the representative unit increases available gas during the CAF calculation
  - The chart below represents the gas-only derate percentages with 11,000 MWs of available oil

NYCA Load Conditions (MW)	Gas-Only Derate	Dec, Jan, Feb: Representative Unit (MW)	All other months: Representative Unit (MW)	Gas Availability (MW)	Oil Availability (MW)	Available Fuel with Representative Unit (MW)
>26,000	95.82%	4.18	100	375	11,000	11,379.18
25,000 - 26,000	91.65%	8.35		750		11,758.35
24,000 - 25,000	69.37%	30.63		2,750		13,780.63
23,000 - 24,000	49.89%	50.11		4,500		15,550.11
22,000 - 23,000	38.75%	61.25		5,500		16,661.25
<22,000	No Constraint	100.00		No Constraint		No Constraint

New York ISO

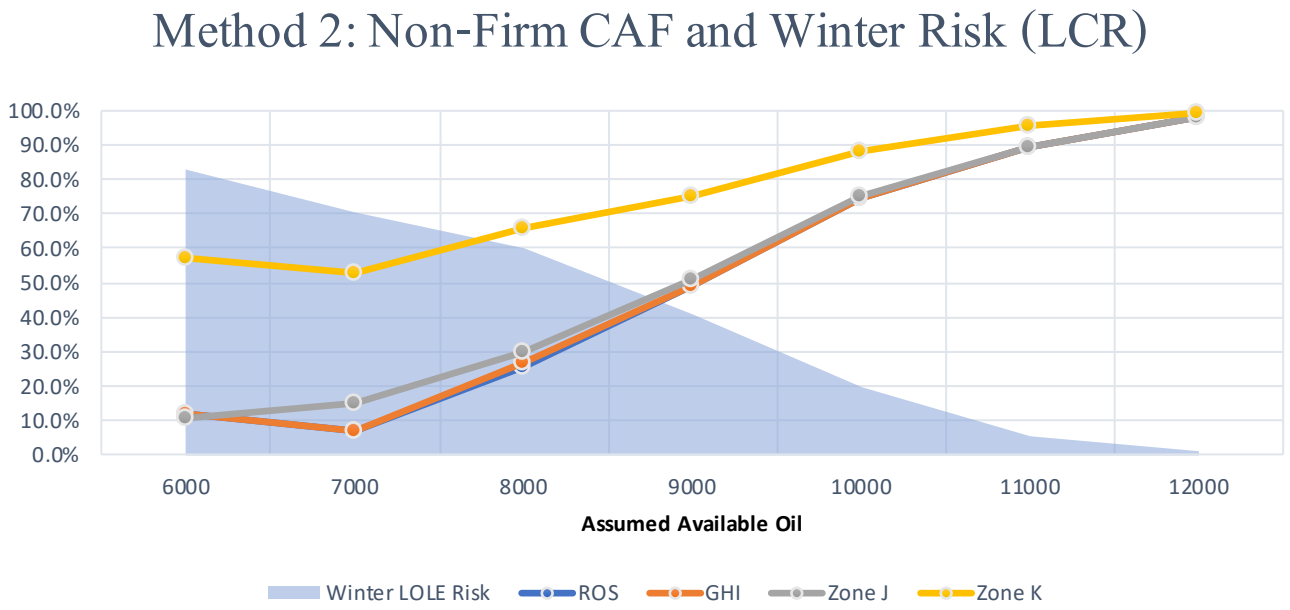
Non-Firm CAF Method 2: CAF Results

Available Oil Modeled	ROS	Zones GHI	Zone J	Zone K	Winter LOLE Risk
12,000	98.1%	98.1%	98.3%	99.4%	0.8%
11,000	89.2%	89.2%	89.5%	95.6%	5.6%
10,000	74.5%	74.6%	75.3%	87.9%	19.9%
9,000	49.1%	49.2%	50.9%	75.3%	41.0%
8,000	25.7%	26.7%	29.9%	66.1%	59.9%
7,000	6.7%	6.7%	14.9%	52.5%	70.2%
6,000	12.2%	12.2%	10.6%	57.1%	83.1%

The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Non-Firm CAF Method 2: Visual CAF Results



The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Non-Firm CAF Method 2a: Modeling

- Method 2a was proposed during 4/17 ICAP Working Group as a variation to Method 2.
- The representative (100 MW) Unit for the Non-Firm CARC is modeled similarly as Method 2, but does not add to the available fuel during the CAF calculation
  - Therefore, the derate for all the units as part of the fuel constraint base model each constrained unit's portion of gas is recalculated to account for the addition of the perfect unit and the representative unit
  - The chart below represents the gas-only derate percentages with 11,000 MWs of available oil

NYCA Load Conditions (MW)	Gas-Only Derate	Dec, Jan, Feb: Representative Unit (MW)	All other months: Representative Unit (MW)	Gas Availability (MW)	Oil Availability (MW)	Available Fuel with Representative Unit (MW)
>26,000	95.87%	4.13	100	375	11,000	11,375
25,000 - 26,000	91.74%	8.26		750		11,750
24,000 - 25,000	69.71%	30.29		2,750		13,750
23,000 - 24,000	50.44%	49.56		4,500		15,500
22,000 - 23,000	39.42%	60.58		5,500		16,500
<22,000	No Constraint	100.00		No Constraint		No Constraint

New York ISO

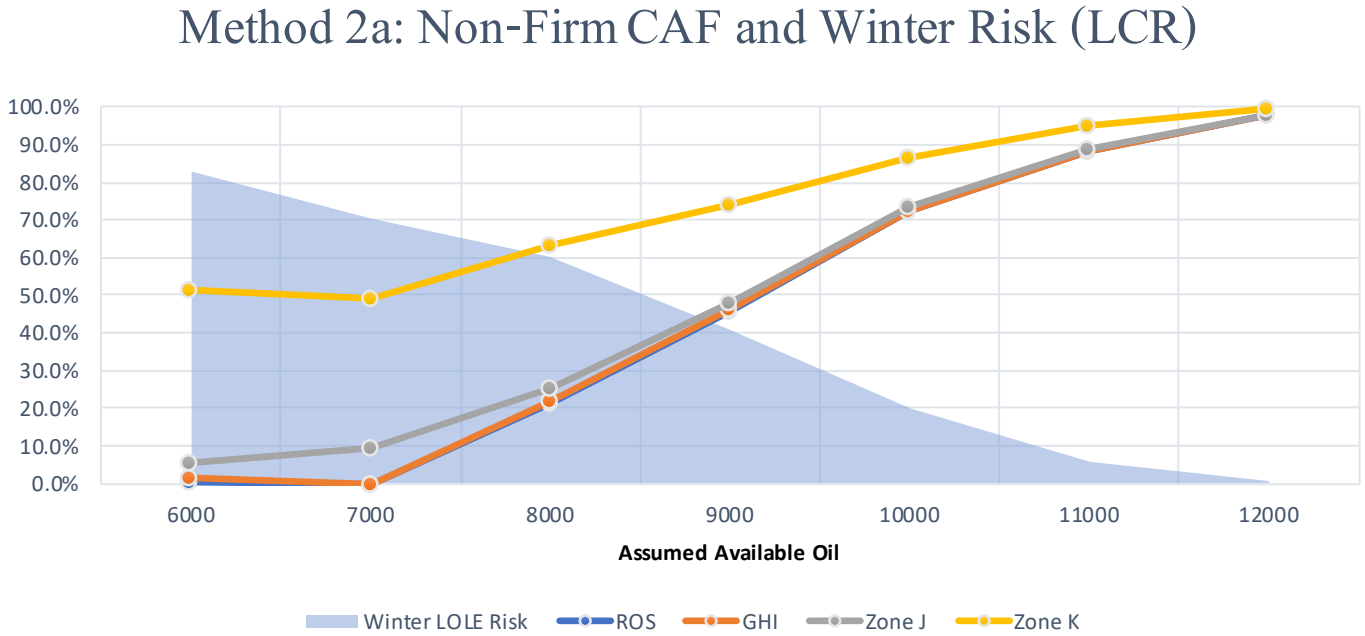
Non-Firm CAF Method 2a: CAF Results

Available Oil Modeled	ROS	Zones GHI	Zone J	Zone K	Winter LOLE Risk
12,000	98.0%	98.0%	98.1%	99.3%	0.8%
11,000	88.3%	88.2%	88.6%	95.1%	5.6%
10,000	72.5%	72.5%	73.4%	86.7%	19.9%
9,000	45.9%	46.1%	47.8%	73.8%	41.0%
8,000	21.5%	21.7%	25.2%	63.3%	59.9%
7,000	0.0%	0.0%	9.5%	49.0%	70.2%
6,000	0.2%	1.4%	5.8%	51.5%	83.1%

The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Non-Firm CAF Method 2a: Visual CAF Results



The Non-Firm CAF results are calculated using the starting point base cases developed respecting the TSL floor values

New York ISO

Key Takeaways

- Today, the IRM/LCR study primarily reflects reliability risk during the summer season. While including fuel constraints based on historical data analysis does little to change the current risk profile, the winter reliability risk drastically increases as the assumed available fuel drops below the initial recommended level
- Such rapid increase in the winter reliability risk is also reflected in significantly lower Non-Firm CAFs when the assumed available oil level drops below 8000 MW
- It should be also noted that the locational differences in the informational Non-Firm CAF values are primarily driven by the allocation of the base model fuel constraints, especially at the lower levels of assumed available oil
  - Among the three methods, Method 1 is least impacted by the underlying fuel constraint allocation, followed by Method 2 and Method 2a
  - The approach used in Method 2a can result in a negative CAF value when winter risk is high
- As with all CAFs, the IRM/LCR database impacts the calculated values, not just the Gas Constraints model

New York ISO

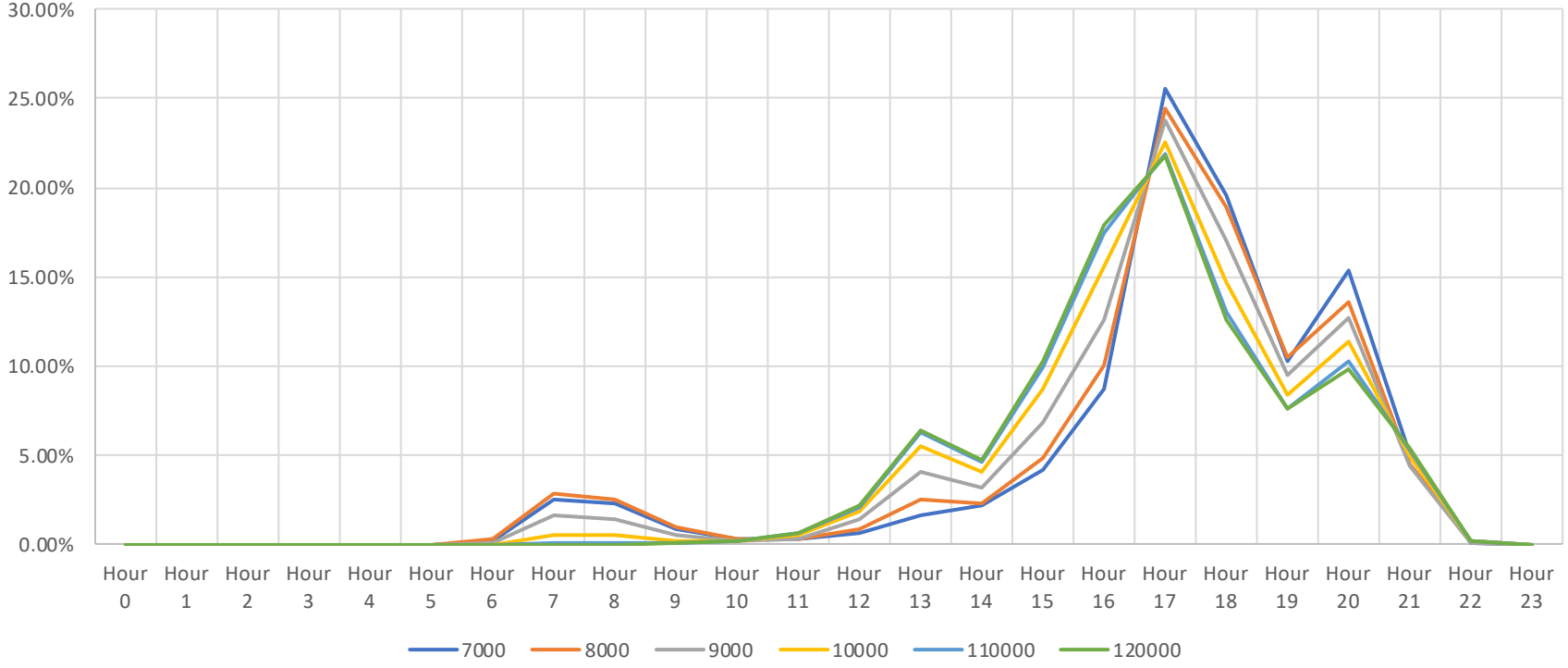
Next Steps

- **The NYISO plans to return to ICAPWG with more information about Non-Firm CAF calculation**
  - NYISO invites continued feedback and comments on the proposed methods and will continue discussions regarding methodology.
  - The NYISO plans to calculate informational Non-Firm CAF values using the fuel constraint sensitivity cases from the 2025-2026 IRM Preliminary Base Case
    - Future Informational CAF values may only use a subset of the approaches shown in this presentation
  - After considering all feedback, the NYISO will finalize the modeling methodology for the Non-Firm CAF calculation
- **The NYISO also invites dialogue with Market Participants to inform future enhancements to the modeling and election processes**

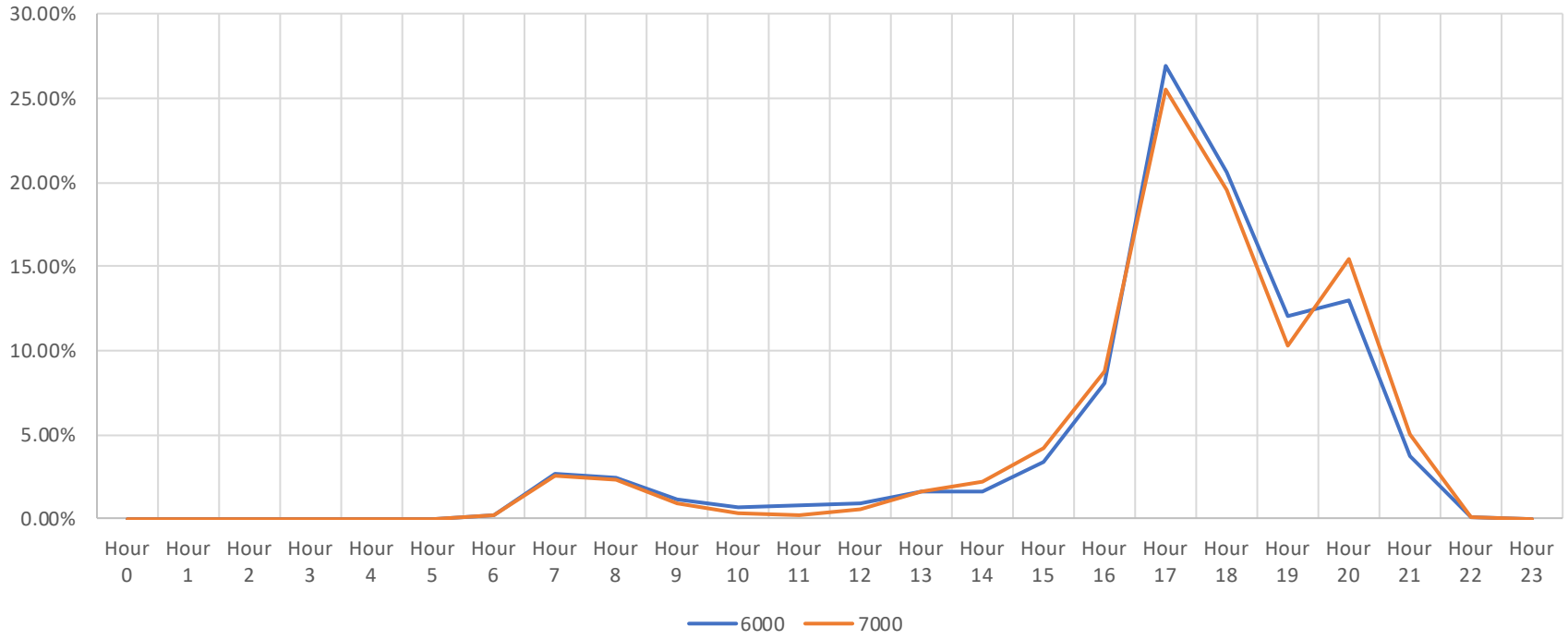
New York ISO

Appendix:
LOLE Distribution

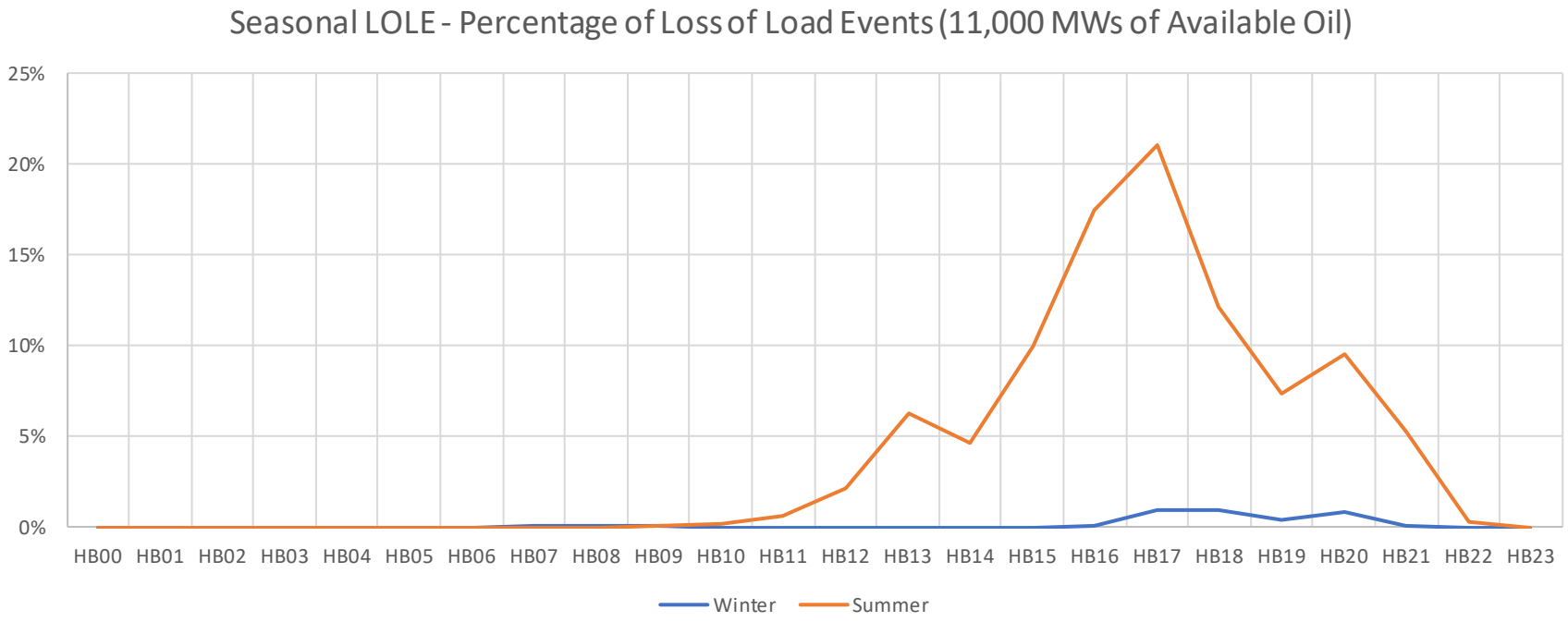
LOLE Profiles for the Starting Point Base Case - 12,000 MW through 7,000 MW Available Oil Levels



LOLE Profiles for the Starting Point Base Case - 7,000 MW and 6,000 MW Available Oil Levels



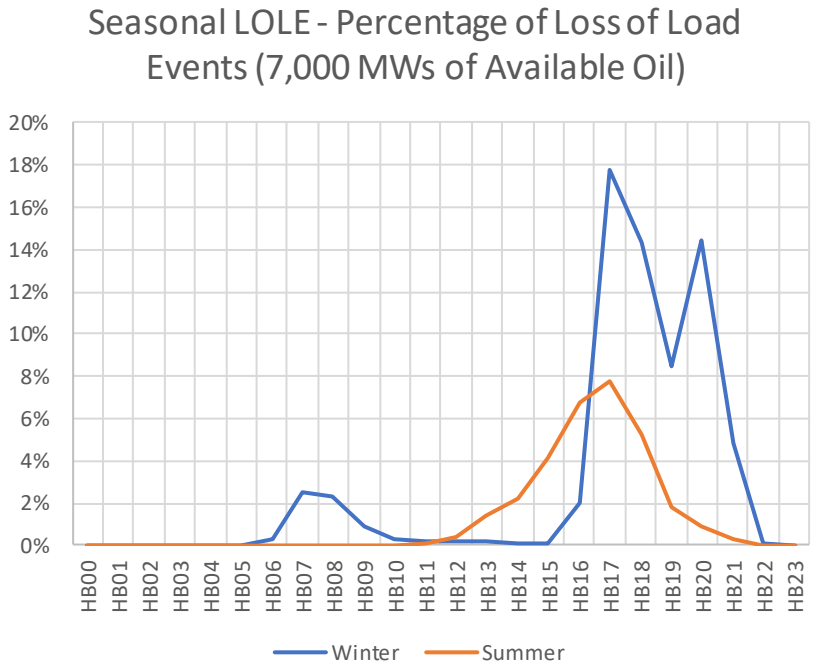
Seasonal Loss of Load Events

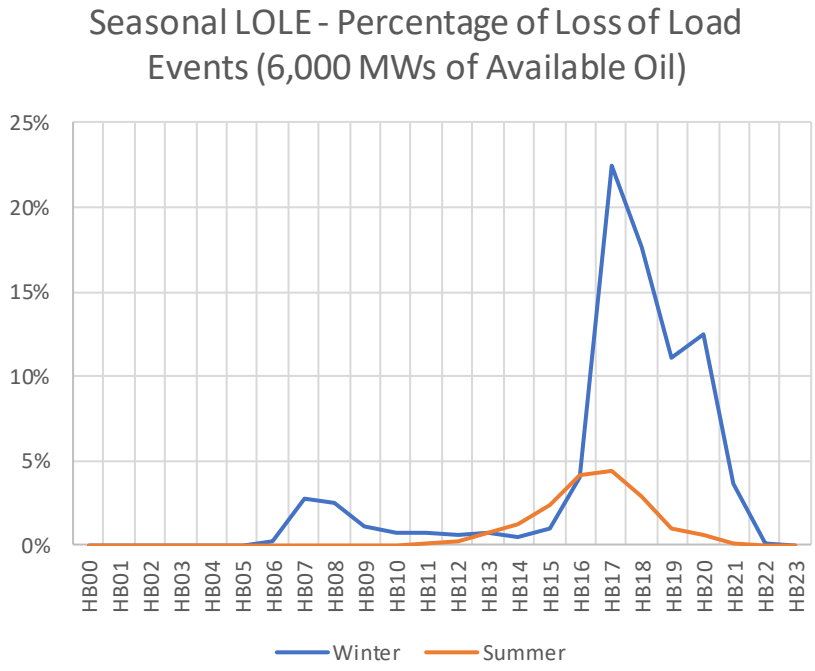


New York ISO

DRAFT – FOR DISCUSSION PURPOSES ONLY

Seasonal Loss of Load Events





New York ISO

Questions?

Email: accreditation@nyiso.com

New York ISO

Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

Sensitivity Cases IRM and LCRs

TSL Sensitivity/LCR Results Comparison

- **Additional cases were run on alternative conditions to evaluate potential impacts of the applicable transmission security (TSL) floor values determined by the NYISO**
  - For the cases with assumed oil availability above 10,000 MW, the EC approved IRM of 22.0% was maintained and LCRs were bound by the TSL floor values
  - For the cases with assumed oil availability of 10,000 – 8,000 MW, the LCRs were locked at the TSL floor values and the LOLE of 0.100 was achieved by adjusting the IRM
  - For the cases with assumed oil availability levels below 8,000 MW, the 0.100 LOLE criteria could not be met without increasing the LCRs above the TSL floor values. In these cases, the Tan45 IRM as shown on slide 6 was maintained and the NYISO's LCR optimizer was allowed to shift within the J, K, and/or G-J Localities to meet the LOLE criteria

Available Oil Assumed (MW)	IRM	IRM Delta	J LCR	J LCR Delta	K LCR	K LCR Delta	G – J LCR	G - J Delta	LOLE (event-days/yr)
Base Case	22.0%	-	80.40%	-	105.30%	-	81.00%	-	0.090
12,000	22.0%	-	80.40%	-	105.30%	-	81.00%	-	0.091
11,000	22.0%	-	80.40%	-	105.30%	-	81.00%	-	0.095
10,000	22.5%	+0.5%	80.40%	-	105.30%	-	81.00%	-	0.100
9,000	24.2%	+2.2%	80.40%	-	105.30%	-	81.00%	-	0.100
8,000	26.7%	+4.7%	80.40%	-	105.30%	-	81.00%	-	0.100
7,000	31.0%	+9.0%	80.40%	-	105.30%	-	83.45%	+2.45%	0.100
6,000	34.3%	+12.3%	81.78%	+1.38%	107.81%	+2.51%	95.57%	+14.57%	0.100

New York ISO